TABLE 5.—*Maximum wind velocities (in miles per hour) in the Lake region during season of navigation.*

Station and period of record.	April.				May.				June.				July.				August.				September.				October.				November.			
	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.	Velocity.	Direction.	Year.	Date.
Lake Superior.																																
Duluth (1871–06)....	60	nw.	1877	20	60	ne.	1877	20	63	ne.	1904	3	48	nw.	1897*	2	51	nw.	1904	19	78	ne.	1881	16	55	ne.	1896	30	70	nw.	1905	24
Marquette (1871–06)	49	w.	1891	30	52	se.	1896*	25	45	se.	1899	13	68	sw.	1901	20	48	sw.	1890	2	61	s.	1893	21	48	sw.	1905	7	48	sw.	1894	14
S.Ste.Marie(1888–06)	60	se.	1893	20	50	se.	1892	18	45	nw.	1898	1	42	nw.	1898	28	50	nw.	1897*	29	56	nw.	1904	30	50	nw.	1893	14	52	nw.	1896	18
Lake Michigan.																																
Milwaukee (1871–06)	54	sw.	1878	10	49	se.	1896	25	60	sw.	1880	4	60	sw.	1874	24	52	w.	1896	9	48	w.	1890	20	60	sw.	1880	16	55	se.	1906	16
Chicago (1871–06)...	72	ne.	1893	20	62	e.	1894	18	72	nw.	1892	13	72	w.	1897	5	72	sw.	1898	16	72	sw.	1900	11	63	se.	1898	19	76	s.	1898	7
Escanaba (1871–06).	48	n.	1878*	10	40	w.	1906	31	40	s.	1876	18	37	nw.	1901	20	44	n.	1875	20	46	w.	1906	11	45	sw.	1880	16	60	n.	1877	8
Lake Huron.																																
Alpena (1873–06) ...	49	nw.	1893	4	44	nw.	1905	9	48	w.	1881	13	60	sw.	1875	15	41	nw.	1901	29	48	w.	1884	10	52	e.	1905	20	50	sw.	1874	5
Port Huron(1874–06)	60	sw.	1893	13	54	sw.	1896	17	52	w.	1898	12	56	n.	1879	11	52	n.	1896	8	46	sw.	1900*	11	54	sw.	1887	24	58	sw.	1894	26
Detroit River.																																
Detroit (1871–06) ...	72	ne.	1893	20	74	sw.	1893	23	60	nw.	1890	17	54	n.	1893	7	40	sw.	1904	20	43	sw.	1900	11	61	nw.	1891	31	76	sw.	1895	26
Lake Erie.																																
Toledo (1871–06)....	60	w.	1892	5	52	e.	1882	6	50	w.	1888	13	49	nw.	1892	24	45	ne.	1875	1	60	s.	1898	24	60	w.	1906	27	68	sw.	1906	21
Sandusky (1877–06).	52	nw.	1880	19	46	nw.	1878	10	57	nw.	1882	29	69	n.	1879	11	63	ne.	1885	9	52	nw.	1897	16	54	n.	1885	29	62	nw.	1879	20
Cleveland (1871–06).	60	n.	1901	20	60	nw.	1905*	11	60	nw.	1898	12	66	w.	1896	26	58	nw.	1896	10	66	nw.	1897	16	62	nw.	1894	11	73	s.	1895	26
Erie (1873–06)......	60	se.	1894	10	60	s.	1875	....	40	w.	1899	7	56	w.	1876	....	40	w.	1895	28	45	sw.	1895	12	48	w.	1887	24	54	w.	1891	23
Buffalo (1871–06) ...	57	sw.	1897	20	58	sw.	1884	2	56	sw.	1893	11	60	sw.	1876	5	58	sw.	1904	20	78	w.	1900	12	75	sw.	1906	28	80	w.	1900	21
Lake Ontario.																																
Oswego (1871–06)...	54	se.	1893	20	40	se.	1894	20	36	ne.	1885	5	38	n.	1888	11	51	n.	1893	29	51	nw.	1892	26	56	se.	1893	14	48	w.	1900*	21

* Also other years.

may be included storms which occasionally move northward along the Atlantic coast, increasing in energy as they reach higher latitudes, and frequently curving inland over the eastern portion of the Middle Atlantic States, as on November 13, 1904.

The storms of the first group are by far the most numerous and the least dangerous. The storms of the second group are not so numerous as those of the first, but they are generally attended by dangerous winds, at least over some portion of the Lake region. Storms of the third group rarely affect the upper lakes, but they cause dangerous winds over lakes Erie and Ontario.

Rarely does it happen that a storm, no matter to which of the above-mentioned groups it may belong, is equally severe in all portions of the Lake region. In the summer season, however, thunderstorms may prevail over the entire Lake region on the same day.

INFLUENCE OF VEGETATION IN CAUSING RAIN.

The following correspondence is published as a matter of interest to many readers:

Allow me to ask your valued opinion on the following matter: Admitting two clouds equally saturated with humidity to hang above two soils, the one teeming with luxuriant vegetation, the other barren and naked, parched by the sun, exuding heat, is the probability greater or not of the cloud in the first instance discharging itself in rain? Or, in other words, do the trees and the greater humidity of the one soil exercise no influence whatever in attracting rain?

* * * You assume two clouds hanging above two different regions, in one of which the soil has a luxuriant vegetation, while the other is barren, naked, and hot; and you ask whether the soil or the vegetation has any influence in "attracting rain".

If the clouds were low down, close to the soil, the warm, hot soil would doubtless contribute a little heat to evaporate the cloud particles and prevent rain, and by thus giving the cloud greater buoyancy the latter might rise a little higher. But neither the wet soil nor the dry soil would be likely to cause any rain.

If you have in mind the ordinary cumulus cloud, which is several thousand feet above the ground, then dry soils and moist soils would have no influence whatever upon the clouds, unless the areas of these dry and wet regions were extensive, such as a hundred miles square, in which case the great mass of warm, dry air would prevent the formation of rain, while on the other hand the mass of warm, moist air would not prevent rain, but would be helpful in case other circumstances conspired.

Neither dry land nor vegetation has any power whatever to "attract rain" from the clouds. If the raindrops are in the clouds they will fall toward the ground by the attraction of gravitation—not by any special attractive power of trees or soils. They will undoubtedly begin to fall in the clouds as soon as they are formed, and the fundamental question is, "How can we make the cloud particles join together into raindrops?" and not, "How can we attract the drops out of the cloud?" So far as meteorologists know at the present time the only place in which raindrops are formed in the warm climates of the globe, or warm seasons of the year, is in the midst of a rapid, ascending current of air. And if you notice that rain falls over a wet soil, rather than over a dry one, you will undoubtedly find that there are ascending currents of air over the wet soil, and descending currents over the dry soil. A descending current warms the air and prevents the formation of raindrops just as truly as an ascending current cools the air and favors the formation.

It is not worth while to appeal to electrical attraction or any other principle in physics, except the cooling by ascent and the mixing of air currents in cloudy regions where temperatures are but little above freezing.

Altho we do not know the exact details of the method of forming raindrops, as distinguished from fine cloud particles, yet it is safe to say that ascending and mixing are the important items, and that when once formed the drops will fall toward the ground. On their way down thru a stratum of very hot, dry air they may evaporate, so that the observer sees the streaks of falling rain, but gets none. In such cases the moist soil is *favorable to the preservation of the raindrops as such,* but we can not say that it *attracts* them from the cloud. This is quite an ordinary case in dry countries. In these cases the moisture is brought from a great distance—a hundred or a thousand miles—by currents of air that are slowly rising and rolling over and over on themselves. The upper part of the roll makes a cloud, the lower part is clear air. Raindrops are formed either slightly at nighttime, when the top of the cloud cools down in the absence of sunshine, or more freely in the daytime, when the vertical extent of the roll is greatly increased by the sun's heat. If in the daytime the overturning extends from sea level upward, then enough moisture is carried up to form a thunderstorm.

I do not see how man can possibly exert any appreciable influence on the formation of rain in your region. The forces involved in this atmospheric overturning, even in the smallest thunderstorm, are enormous. More energy is involved than is represented by all the steam engines in the world. The best that can be done is to save the water that falls in wet regions and use it to irrigate in dry. An alternative method is to shade the dry regions from the midday heat and wind, so as to diminish the loss of moisture by evaporation.

WEATHER BUREAU MEN AS EDUCATORS.

In the Department of Agriculture number of the Vermont Bulletin, the official publication of the University of Vermont and State Agricultural College, we find the following synopsis of the courses in meteorology given by Mr. W. H. Alexander, local forecaster, Burlington, Vt.:

1. Elementary Meteorology: The atmosphere; its moisture; dew; frost; haze; fog; clouds; precipitation; winds; cyclones; thunderstorms; climate; weather; weather bureaus. The use of ordinary meteorological instruments; observations; the construction and study of weather maps. Lectures, recitations, laboratory. *Elective, one hour, Junior or Senior, second half.*

2. Advanced Meteorology.—Theories relative to various meteorological phenomena; the law of storms; application of the principles of meteorology to the interpretation of climates; climate as a factor in social and economic problems. Discussion of charts, diagrams, photographs; conduct of a series of meteorological observations; weather forecasting. Lectures, theses, laboratory. *Elective, two hours, Junior or Senior, first half.*

Mr. M. L. Fuller, observer, Canton, N. Y., reports that in the new State Agricultural School of St. Lawrence University he is to give considerable instruction. It is intended to introduce lectures on climatology and the work of the Weather Bureau early in the course, and to make the instruction in these lines as extensive as practicable.

Mr. George Reeder, section director, Columbia, Mo., reports that he has been appointed lecturer on climatology at the University of Missouri.

Mr. G. N. Salisbury, section director, Seattle, Wash., reports that his regular course of instruction in practical meteorology at the State University was given to a class of 7, and consisted of a series of 14 lessons of two to three hours each, extending from October 11, 1906, to January 24, 1907. The work comprised impromptu talks, quizzes, and laboratory work, which embraced observations, and the drawing and study of weather maps.

On June 26, 1907, instruction in elementary meteorology was begun with a class of 10 at the summer school of the university. The course comprised 16 lessons of two hours each, three times a week. Davis's Elementary Meteorology was used as a textbook, and was supplemented by talks and laboratory work.

Mr. A. H. Thiessen, section director, Raleigh, N. C., reports that the president of the Agricultural and Mechanical College, at West Raleigh, has authorized the expenditure of $50 for lantern slides to be used in giving instruction in meteorology and climatology to the students of that college. There seems to be an increasing desire on the part of the students to take up this study.

Mr. J. R. Weeks, local forecaster, Binghamton, N. Y., reports that on July 25 he had the pleasure of visiting Mr. DeLancy M. Ellis, Chief of the Division of Visual Instruction, New York State Department of Education, at his office in the Capitol at Albany. This division has charge of the work in the schools of the State relating to the use of lantern slides, pictures, photographs, etc., as a means of instruction. Until recently, however, no attempt was made to furnish material of this nature for use in physical geography classes, and the views used were of descriptive geography or of a general nature, a collection of over 25,000 selected negatives having been made from which sets of beautiful colored slides for use in the stereopticon are issued to the schools, about $20,000 being spent yearly by the State for the purpose.

But now, in addition to the lecture entitled "The weather, what it is and how it is observed and forecast", which, beginning with February last, has been loaned free to such schools as request it, by cooperation between the United States Weather Bureau and the New York State Department of Education, Division of Visual Instruction, Mr. Ellis is now selecting the negatives and having prepared in his office a beautiful set of colored slides illustrating four divisions of physical geography study—the earth as a globe, the atmosphere, the geosphere, and the hydrosphere. The entire series, containing, when completed, several hundred views, will be reproduced in large numbers and the duplicates deposited in many of the public high schools of the State for permanent use. These stereopticon views are not intended for lectures simply, but are to take the place of wall maps, charts, and pictures for daily class room use. For instance, in looking over the nucleus of the collection Mr. Weeks was shown a number of beautiful colored photographic reproductions, in the form of lantern slides, of the charts of isotherms, isobars, rainfall, etc., for the world, found in Bartholomew's Physical Atlas, permission to make them having been kindly granted by the publishers. These, like most weather maps and charts, are too complicated and rich in detail for ordinary lecture use, but are unexcelled for daily class room study. Publications of the U. S. Weather Bureau, Davis's Meteorology, Hann's Lehrbuch, etc., have also been freely drawn upon for reliable diagrams and charts, and striking views showing contrasts of weather influence on humanity and on vegetation have been selected from the best collections of many travellers. Helpful pamphlets are to accompany the series, and Mr. Ellis expects to visit many of the schools in the interest of this work.

In regard to public lectures and reviews, Mr. Ellis said that enthusiastic letters had been received by him from users of the Weather Bureau lecture, and that it is desired to continue permanently the plan adopted this year and approved by the Chief of Bureau.

Mr. Weeks further reports that this lecture, prepared by himself, entitled "The weather, what it is and how it is observed and forecast", continues in great demand, requests for it coming not only from all parts of New York, but from Nebraska and other States, so that the use of text and slides is usually arranged for several weeks in the future.

The following lectures and addresses by Weather Bureau men have been reported:

Mr. George S. Bliss, of the Philadelphia, Pa., office, March 20, 1907, before the physics class at George School, Pa., on "The work of the Weather Bureau"; May 2, 1907, at Darlington Seminary, West Chester, Pa., on "The causes and controlling forces of storms"; also June 22, 1907, before the Brandywine Grange, at West Chester, Pa., on "Methods of weather forecasting".

Mr. M. E. Blystone, October 2, 1907, before the Men's Club of the Trinity Union Methodist Episcopal Church at Providence, R. I.; October 15, 1907, before the Men's Club of the Episcopal Church at Pontiac, R. I.; also October 16, 1907, before the Men's Club of the Broadway Baptist Church of Providence, R. I., on "Weather forecasts".

Mr. W. T. Blythe, of the Indianapolis, Ind., office, October 30, 1907, before the Young Men's Christian Association at Peru, Ind., on "Meteorology and the work of the U. S. Weather Bureau".

Prof. H. J. Cox, April 9, 1907, before the Chicago Yacht Owner's Association, on "Wind squalls"; also August 13, 1907, before the Wisconsin Cranberry Growers' Association, at Cranmoor, Wis., on "Temperature and frost conditions in cranberry marshes".

Mr. H. W. Richardson, October 23, 1907, before the Ladies'